Guide for Cutting Allegheny Northern Hardwoods

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

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Felling yellow birch in a northern hardwood stand.

GUIDE FOR CUTTING ALLEGHENY NORTHERN HARDWOODS

Prepared by Northeastern Forest Experiment Station, Forest Service

Description of the Forest [1]

Sugar maple, yellow birch, and beech are the characteristic elements of the Allegheny hardwoods-hemlock type of forest on north and east slopes and on plateaus; black birch and red maple are common on the west slopes. In the absence of fire, hemlock usually becomes an important part of the stand. The valuable and fast-growing black cherry, like white pine, thrives in openings caused by fire, windthrow, or clear cutting and is often accompanied by basswood, yellow poplar, ash, and cucumber magnolia. Less desirable species are fire cherry, aspen, and hophornbeam.

If one-half or more of the trees 6 inches and larger in diameter breast high [2] are beech, birch, and sugar maple, or these species plus the other desirable species mentioned, then these instructions will apply to your woodland.

[1] 614 Bankers Securities Building, Philadelphia 7, Pa.

[2] Diameter breast high is at 4½ feet above average ground level. Stump diameter is an inch or two larger.

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Estimate the Stand[3]

If you plan to sell standing trees for the buyer to cut you will need to make a complete inventory of the salable trees on the tract. If you plan to cut your own timber and sell logs, measure a sample, perhaps 10 or 20 percent of the trees, to get a fair idea of the volume and quality of timber available. Scale the logs after cutting to correct this rough estimate.

Knowing what you have to sell, you are in a position to secure a fair price for it. In making an inventory, tally all trees 8 inches in diameter and larger, designating them as best fitted for saw timber, pulpwood, or perhaps just fuel wood, by using a form similar to that shown on pages 8 and 9. In general, trees 14 inches in diameter and larger should be used for saw timber. Do not cut the trees below 14 inches unless they are crowded and need thinning.

The timber estimating form, just referred to, is merely a guide. Figures from a 1/5-acre tally have been inserted to illustrate its use. The products in columns 4, 6, 9, and 11 might be changed, where appropriate, to in-

[3] Your State forester, extension forester, local Forest Service officer, foresters of other Government agencies, or private consulting foresters can help you estimate, mark, manage, and market your trees. Seek their counsel before cutting. For more detailed information obtain a copy of U. S. Department of Agriculture Farmers' Bulletin No. 1210, Measuring and Marketing Farm Timber.

clude mine props, or to exclude items not marketable.[4]

Plan a 40-Percent Cut of Sawlogs

A good general rule to follow in Allegheny northern hardwood sawtimber stands is to harvest no more than about 40 percent of the total board-foot volume. The figures used on the sample form are from a northwestern Pennsylvania stand. The 20-percent sample shows 1,714 board feet and 7.16 cords of chemical wood, or 8,570 board feet of sawlogs and almost 36 cords per acre. Forty percent would be 3,428 board feet per acre. The volume cut will be restored by growth within 10 to 15 years, when a second cut, yielding timber of even higher value, should be possible.

Mark the trees to be cut, reserving for the next cut clean-boled, straight, vigorous trees of sugar maple, black cherry, ash, and other valuable species. Free the crowns of trees that are reserved, but do not open up around the crowns of yellow birch too much. Note carefully trees which might make veneer logs and try to market them for that purpose.

Some acres will be cut heavily and some lightly, but over any 5 acres the cut should add up to about 40 percent of the total board-foot volume. Do

[4] Local markets determine the kind and value of trees suitable for saw or veneer logs, pulpwood, chemical wood, or fuel wood. The local market and value of each product should be ascertained. Usually the best values are obtained for veneer or sawlogs. Smaller or less valuable trees and tops may be utilized for pulpwood or chemical wood if not needed for future saw timber. Fuel wood is usually made from tops or trees not suitable for other products.

not clear cut areas larger than 1 acre without professional advice.

Chemical Wood and Pulpwood

Chemical wood, pulpwood, and mine props should usually come from thinnings. Save potentially valuable sawlog trees for future growth, unless competent foresters advise other types of management. In the case shown on the sample estimating form, the small trees need an improvement cutting, and about half, or 18 cords per acre, can be cut to concentrate growth on trees that will make future sawlogs.

In dense second-growth stands first thinnings should be made when the largest trees are about 12 inches in diameter. Cut lightly over the whole stand, taking out large, limby, or crooked trees which crowd the stand. *Cut no trees under 7 inches in diameter unless you have time to waste.* Skid pole-lengths to the haul road for bucking and piling; for distances up to about 600 feet this is cheaper than stump piling.

The cost of all operations rises sharply when trees below 8 inches in diameter are cut. Workers earn less and the buyer gets less actual volume per stacked cord.

Small Trees

If the merchantable volume is made up of large logs, rather than many small ones, it will cost much less per thousand board feet to cut and haul. This will make for greater profit if you

do your own logging; it should result in a better price if you sell stumpage because the operator can log with less expense.

Twice as much time is required to cut a cord of chemical wood from 4-inch trees as from 12-inch trees. It takes forty-eight 4-inch trees to make a cord, but only about 3½ of the 12-inch trees. A cutter can produce more than 1½ times as much solid pulpwood per day from trees 8 inches in diameter and larger as from trees 5 to 8 inches in diameter.

Logging 15-inch trees requires almost double the number of man-hours per 1,000 board feet as at logging 29-inch trees does. Fifty percent more man-hours are required to log and mill 1,000 board feet from 12-inch trees than from 24-inch trees.

Do Not Cut—

(a) If your estimate shows the merchantable cordwood volume to be less than about 10 cords per acre; or (b) if there is less than 4,000 board feet per acre in trees 14 inches in diameter and larger, except when you plan to take out only occasional trees containing high-value specialty products, such as veneer logs. This does not mean that young, dense, pole stands should not be thinned for fuel wood, chemical wood, pulpwood, small props, or lagging.

SCALING LOGS

Measure the volume of logs cut by using one of the log rules on page 7. The Doyle rule is most commonly

used in the East, but it benefits the buyer by giving too low a volume for logs under 28 inches in diameter. The Scribner rule is more accurate but the International is the fairest and most accurate. It allows a ¼-inch saw kerf and gives the lumber content of the log resulting from careful sawing by good methods. If another rule is proposed, check it against the values given on page 7 to see how much it varies from the International rule.

International (¼-inch) Rule

Diameter of log at small end, inside bark (inches)	Scale in board feet for log length of—				
	8 feet	10 feet	12 feet	14 feet	16 feet
8	15	20	25	35	40
10	30	35	45	55	65
12	45	55	70	85	95
14	65	80	100	115	135
16	85	110	130	155	180
18	110	140	170	200	230
20	135	175	210	250	290
22	170	215	260	305	355
24	205	255	310	370	425

Doyle Rule

8	8	10	12	14	16
10	18	23	27	32	36
12	32	40	48	56	64
14	50	62	75	88	100
16	72	90	108	126	144
18	98	122	147	171	196
20	128	160	192	224	256
22	162	202	243	283	324
24	200	250	300	350	400

Scribner Rule

8			25	28	32
10			40	45	50
12			60	70	80
14			85	100	115
16			120	140	160
18			160	190	213
20			210	245	280
22			250	290	334
24			300	350	404

(1)	Hardwoods									
	(2)	(3)	(4) Number of trees				(5)	(6) Volume, cords		
Diameter class[2] (inches)	Board feet per tree	Cords per tree[3]	Saw timber	Pulp-wood	Chemi-cal wood	Fuel wood	Volume, board feet	Pulp-wood	Chemi-cal wood	Fuel wood
8	.....	0.20	.....	.....	3	.....	.....	.....	0.60	.....
9	.....	.25	.....	.....	3	1	.....	.....	.75	0.25
10	42	.30	.....	.....	6	1	.....	.....	1.80	.30
11	61	.35	.....	.....	3	.....	.....	.....	1.05	.....
12	75	.40	.....	.....	5	1	.....	.....	2.00	.40
13	95	.48	.....	.....	2	.....	.....	.....	.96	.....
14	114	.56	2	.....	.....	.....	228	.....	.....	.....
15	137	.65	1	.....	.....	.....	137	.....	.....	.....
16	160	.75	1	.....	.....	.....	160	.....	.....	.....
17	192	.85	.....	.....	.....	.....	.....	.....	.....	.....
18	224	.95	2	.....	.....	.....	448	.....	.....	.....
19	255	1.07	.....	.....	.....	.....	.....	.....	.....	.....
20	286	1.18	.....	.....	.....	.....	.....	.....	.....	.....
22	354	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	421	.....	1	.....	.....	.....	421	.....	.....	.....
26	500	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	600	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	700	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total (⅕-acre)	.....	.....	7	.....	22	3	1,394	.....	7.16	.95
Total per acre	.....	.....	35	.....	110	15	6,970	.....	35.80	4.75

[1] Tally in columns 4 and 9 the number of trees in each diameter class. Simple multiplication will then give the board-foot and cord volumes for each class. Where values for saw timber and cordwood overlap, distinguish in your tally between timber and cordwood trees.

[2] Diameter of tree measured at breast height (4½ feet). If you choose to group your trees by 2-inch classes, as 8,

Estimating Form [1]

Softwoods									
(7) Board feet per tree	(8) Cords per tree [3]	(9) Number of trees				(10) Volume, board feet	(11) Volume, cords		
		Saw timber	Pulp-wood	Chemical wood	Fuel wood		Pulp-wood	Chemical wood	Fuel wood
.....	0.07	.....	.....	.....	.....	.....	.....	.....	.....
.....	.10	.....	.....	.....	.....	.....	.....	.....	.....
70	.13	.....	.....	.....	.....	.....	.....	.....	.....
91	.15	.....	.....	.....	.....	.....	.....	.....	.....
112	.18	.....	.....	.....	.....	.....	.....	.....	.....
141	.21	.....	.....	.....	.....	.....	.....	.....	.....
170	.26	.....	.....	.....	.....	.....	.....	.....	.....
207	.31	.....	.....	.....	.....	.....	.....	.....	.....
244	.38	.....	.....	.....	.....	.....	.....	.....	.....
282	.44	.....	.....	.....	.....	.....	.....	.....	.....
320	.53	1	.....	.....	.....	320	.....	.....	.....
370	.61	.....	.....	.....	.....	.....	.....	.....	.....
420	.70	.....	.....	.....	.....	.....	.....	.....	.....
500	.78	.....	.....	.....	.....	.....	.....	.....	.....
590	.....	.....	.....	.....	.....	.....	.....	.....	.....
690	.....	.....	.....	.....	.....	.....	.....	.....	.....
800	.....	.....	.....	.....	.....	.....	.....	.....	.....
970	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	1	.....	.....	.....	320	.....	.....	.....
.....	.....	5	.....	.....	.....	1,600	.....	.....	.....

10, 12, etc., remember that in classifying, diameters greater than the odd inch go in the higher class. (Example: A tree 11.1 or 13.0 inches is in the 12-inch class; one from 9.1 to 11.0 inches is in the 10-inch class.)

[3] This is for standard 48-inch cords. For 52-inch cords decrease each item by 7.5 percent. For 60-inch cords decrease each item by 20 percent.

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